it is porous, the nano-particles fill the pores and so the nano-nickel is at least as effective as platinum, at a cost of about 50% that of platinum. We control the pore size directly when we control the diameter of the nano-particles.

FCTN: Have you encountered any problems due to the high temperature experienced in SOFCs?

Carpenter: None, except for problems with the SOFCs themselves. Two of the test SOFCs experienced seal problems.

FCTN: Does this have any impact SOFC applications?

Maloney: As you know, current SOFCs must run at one speed. Thermal cycling to do load following can crack the electrodes. Because thermal cycling doesn't affect the nano-nickel catalysts, it raises the possibility of using SOFCs in portable FC applications.

FCTN: How are you applying this technology to PEM electrode assemblies?

Carpenter: We use sonic energy to disperse the particles in an ink fluid, directly replacing platinum. The nano-nickel replaces both the platinum and the carbon in the membrane electrode assemblies. Our first PEM electrodes are now being tested by several MEA manufacturers.

FCTN: How do the results of your process compare with what can be obtained from ion beam or vapor deposition precesses?

Carpenter: The run rates are dramatically higher than anything that can be accomplished with the deposition processes.

FCTN: It would seem that this technology has other applications. What are you looking at in the short term?

Maloney: First the platinum catalyst replacements, then water hydrolysis, biosensors and filtration.

FCTN: Where do you see your operation evolving over the next decade?

Maloney: All these materials we are inventing will be marketd within 7 to 10 years. We are filing our patents right now and exploring various relationships with major manufacturers.

FCTN: Is your process readily scalable to industrial production?

Capenter: We can increase production simply by adding more heating elements. In fact, the reactor runs more efficiently with more heating elements. The reactor itself is a modular design, so it is relatively easy to scale up to whatever quantity of output is needed.

FCTN: Would the same hold true for hydrolysis? I ask this because of the well-reported decline in fresh water supplies globally.

Maloney: Hydrolysis machinery that uses this technology can be scaled exponentially. As this application is developed, it will directly compete with existing electrolysis technologies. As for hydrogen production, the technology is more cost-effective than steam reforming of methane.